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159774

מספר:
Number

תאריך:
Date

הקודם/נחתך 08-01-2004
Ante/Post-dated

בקשה לפטנט
Application For Patent

אני, (שם המבקש, מענו וגוף מזוהה – מקום התאגידו)
I, (Name and address of applicant, and in case of body corporate-place of incorporation)

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שיטת ומערכת לייצור אריחים זקורטיביים עם דיזינות אורגניות פולטות או
Method and system for creation of illuminated decorative tiles using organic light emitting diodes

(באנגלית)
(English)

Hereby apply for a patent to be granted to me in respect thereof.

בקשות חלוקה Application of Division		בקשת פטנט מוסף Appl. for Patent of Addition		דרישת דין קדימה Priority Claim		
מבקש פטנט from application No.	מספר Mark	לבקשת פטנט to Patent/Appl. No.	מספר Mark	מספר/סימן Number/Mark	תאריך Date	מדינת האיגוד Convention Country
Dated	מיום	Dated	מיום			
P.o.A.: General filed in this case		יפוי כח: כלל モガシ ベンジン ゾウ				
המען למסירות מסמכים בישראל Address for Service in Israel						
C. 151332.4						
REINHOLD COHN AND PARTNERS Patent Attorneys P.O.B. 4060, Tel-Aviv						
חתימת המבקש Signature of Applicant בשם המבקשים, ר'ינhold כהן ושותפיו ע"י: - 						
2004 Year שנת January בחדש 8 of חיום This						
לשימוש הלשכה For Office Use						

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Delete whatever is inapplicable

שיטת ומערכת לייצור אריחים זקורטיביים עם דיזוז אורGANIC POLYMER LIGHT

Method and system for creation of illuminated decorative tiles using organic light emitting diodes

Industrial Ink Jet Technology (2003) Ltd.

טכנולוגיות אינק ג'ט תעשייתיות (2003) בעמ'

C. 151332.4

FIELD OF THE INVENTION

- This invention relates to Organic Light Emitting Diodes (OLED) and to decorative tiles.

BACKGROUND OF THE INVENTION

A recent development in the field of illumination generating devices are lightning panels based on Organic Light Emitting Diodes (OLED). OLED panels are based on organic materials that emit light when electric currents excite them . For the present application, it is sufficient to mention also that OLED panels which contain organic materials are either:

(1) made of conjugated polymers and can be manufactured by ejecting a solution of the polymer through tiny nozzles such as available in ink jet mechanisms and are referred to as PLED, or

(2) made of small organic molecules and are produced by vacuum deposition and/or sputtering and are referred to as SOLED

US patent 6,565,231 (R.S.Cok) published May 20, 2003 and entitled "OLED Areal Illumination Lightning apparatus" discloses an electroluminescent display device having a substrate, anode, cathode, and organic electroluminescent layer and encapsulating cover. The two electrodes are extending out of the device and are connected to power source. This patent relates to multiple illuminated panels arranged in various 2D and 3D self standing illumination combinations. However, there is no reference of a possibility of using more than one color per panel, nor a reference to the incorporation of the panels inside another device.

On the other hand, there is abundant information in the technical literature, as well as multitude of patents which describe multicolor illuminated OLED devices in the form of display matrices, active or passive that are structured as an X/Y matrix of pixels, each pixel containing one or more colored subpixels .

These OLED matrix devices are intended to be used as flat panel displays for TV, computer, PDA and cellular telephones displays and are structured to have multiplicity of addressable picture elements so that the display is changeable along the temporal dimension, up to the level where superb video images can be displayed.

However, there are situations where a fixed, unchanging patterned and sometime multi colored lighted image is required to be displayed. For example as decorations which can also be embedded into or on other structures. In such case, the provision of address lines and their associated circuitry is redundant and unnecessarily complex and expensive.

A method and process for producing simplified full color OLED displays is described in U.S. Patent Application No. 60/525,179 entitled "Method and system for patterning an organic light emitting diode display by printing" by the same inventors of the present application. Such displays while being static, can be operated by two electrodes only. The thickness of all layers combined can be sub milli metric, and if plastic material is selected for the base, this type of flat panel display can be folded or made to conform to curved surfaces.

US patent application 60/525,179 mentions also the possibility of patterning of SOLED fixed multicolored displays, using conventional lithographic processes. Both PLED and SOLED fixed multicolor displays are dealt by the present invention.

SUMMARY OF THE INVENTION

It is an object of the invention to use OLEDs for the display of fixed patterned images having one or more colors per display, inside tiles similar in size and shape to ceramic tiles.

It is another object of the invention to have OLED containing tiles of sufficient strength so that they can bear pressure of the amount that conventional tiles are designed to withstand in walls or floors.

It is another object of the invention to enable easy incorporation of the OLED containing tiles of the invention into construction elements such as walls, floor and ceilings, including also into such structures that are paved by conventional ceramic tiles.

It is another object of the invention to enable the functionality of the OLED containing tiles in structures that are subjected to the severity of the elements or to have them embedded in water in the walls or floors of swimming pools.

It is another object of the invention to contain and display in the tiles illuminated fixed images using patterned or pixelized display whose patterns or pixels are not individually addressable.

It is yet another object of the invention to use an OLED to display a fixed image by printing the image in patterns or pixels.

● The invention proposes a way to assemble the OLED displays within the tiles by:

1. Using a front panel made of relatively thick glass panel such that can stand pressure and impacts
2. Using a second backing structure that is made of glass or ceramic or concrete
3. Having the OLED inserted and assembled between these two parts, or having the OLED printed on the transparent front glass panel.

The invention proposes also means to supply the device of the invention with sufficient power to enable its illumination function over the life of the OLED substances.

The invention proposes by reference to US patent application 60/525,179, applied by the same inventors of the present application a way of patterning the OLED display that eliminates addressing by row and columns or the individual addressing of pixels and requires very few electrodes, even as few as two.

DETAILED DESCRIPTION OF THE INVENTION

Essentially, the invention is based the use of OLEDs for the display of fixed images permitting a very simple addressing scheme in comparison to conventional pixelized displays.

The fixed image of the display, prepared according to US patent application 60/525,179 by the same inventors of the present application, is executed on a glass plate A with a sufficient thickness to withstand the pressure that can be applied to the tile, which is a function of the position of the tile [whether it is mounted on a wall or in a floor]. Once the OLED display is sealed, the glass plate A is glued or cemented by glass frit to another plate B which is made of glass, cement, concrete, metal or plastic such as ABS or polycarbonate of a sufficient thickness according to the external pressure tolerance of the tile. As the standard thickness of ceramic tiles is 9 mm it is clear to those familiar with the art can understand that it is possible to create the tiles of the invention to have strength that will allow them to be installed not only in walls covered by tiles but also in floors. The invention is not limited to have tiles which fit with the thickness of ceramic tiles, but also as self standing devices and the thickness selected

can be smaller or larger than 9 mm.

The assembly of glass plate A to back plate B is done in a manner that the OLED printed surface of glass plate A is positioned against one of the surfaces of back plate B. In this way the imaged OLED is sandwiched between the two plates and can be seen through the transparent glass plate A.

If glue is used it can be spread over the outer, insulating layer of the OLED [in glass plate A] which can be compatible with some glues such as acrylic based glue.

Then the second plate, B, is cemented to the glue. In this way the two plates constitute a sandwich in which the OLED is in between them. The cathode and anode of the OLED are connected each to a wire and then parts of these two wires are left outside the device prior to gluing for allowing connection to a power source.

In a second embodiment, the plate B, have raised narrow edges along its circumference, and the OLED is not assembled over the total area of glass plate A, leaving some free area on the edges of glass plate A along its circumference. The two plates then bonded together either by glue or by glass frit which is then melted and bond the two plates together. In this embodiment a space is formed between the two plates. This empty space is utilized for containing internally in the tile the power source of the OLED in the form of flat thin batteries. In such case the wires soldered to the anode and cathode remain inside the device.

In a third embodiment, similar to the second, the glass plate B has one or more recesses built into it that can be fit in size to house the batteries.

The device of the present invention include also means that enables it to be inserted into floors, walls or ceilings which are covered with other tiles.

In one embodiment the back of the OLED containing tile as well as its sides are mounted with flat, thin layers of elastic material such as RTV, and the size of the device is kept very close to that of surrounding tiles, being made of ceramic, marble, glass or mosaic or any other type of decorative tiles. When manufactured in this way, the tile of the invention can be inserted into the space allocated by gentle force and it can be retained without using mortar.

The invention is not limited to the RTV fitting of the tile of the invention which are to be embedded together with other tiles, made of ceramics,

stone or glass. The fittings can be made of various other materials such as metal or plastic, and the selection of fitting material can be determined by engineering and architectural needs.

What is novel here is the design of a special, illuminated tile that can be embedded smoothly into existing types of paving elements.

While the above description of the invention relates to flat tiles, it is not limited only to such. The invention is extended also to curved tiles when glass plates A and B are manufactured, for example by molding, as curved plates with suitable curvatures that will allow them to fit together to devices of the same geometrical nature.

The activation of the OLED device enclosed in the tile of the invention can be from any switching element in case the device receive power from external source.

In the case that both the OLED device and its power source, e.g. batteries are enclosed inside the tile, activation of the OLED, i.e. switching on its connection to the power source, can be achieved by various means such electromagnetic or RF circuits, or by photo sensors, or by pressure sensors. The selection of the type of the switching circuit can be determined according to the specific use of the tile and the ability to reach its proximity.

DESCRIPTIONS OF THE DRAWINGS

Figure 1 is a cross section of the tile device in its basic embodiment showing the glass plates A and B and the OLED sandwich between them.

The 2 wires which are connected respectively to the anode and to the cathode are not shown.

Figure 2 is a cross section of the second embodiment of the tile device of the invention showing (a) the raised edges of glass plate B and the bonding frit at the edge location and (b) the batteries contained within the space formed between the two plates.

Figure 3 is a cross section of the third embodiment where glass plate b have recesses in it to contain the batteries.

Figure 4 is showing the tile of the invention mounted with elastic side bands and lining and how it can be fit into a recess of a surface covered by conventional tiles.

Novei applications enabled by the Invention

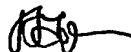
The OLED self illuminating tile can serve first as a light source panel embedded into a surface covered by conventional tiles. It is of sufficient strength to serve even on floors. It is also have its own enclosed power source and It is therefore an improvement over US patent 6,565,231, which describes illuminating panels not having the resilience of the tiles of the invention, nor own power source.

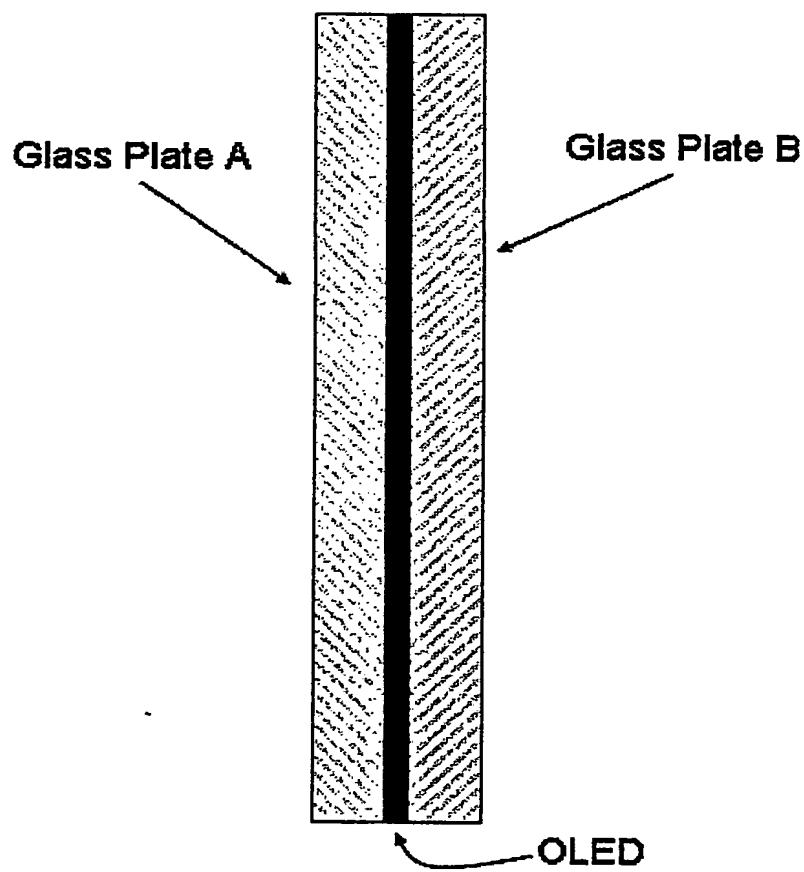
More important, the present invention incorporate by reference US patent application No. 60/525,179 of the present inventors, thus enabling to incorporate the decorative features of patterned or pixelated OLED having only two electrodes. This makes the use of the device of the invention more suitable to tile covered surfaces, most of which have decorative functions.

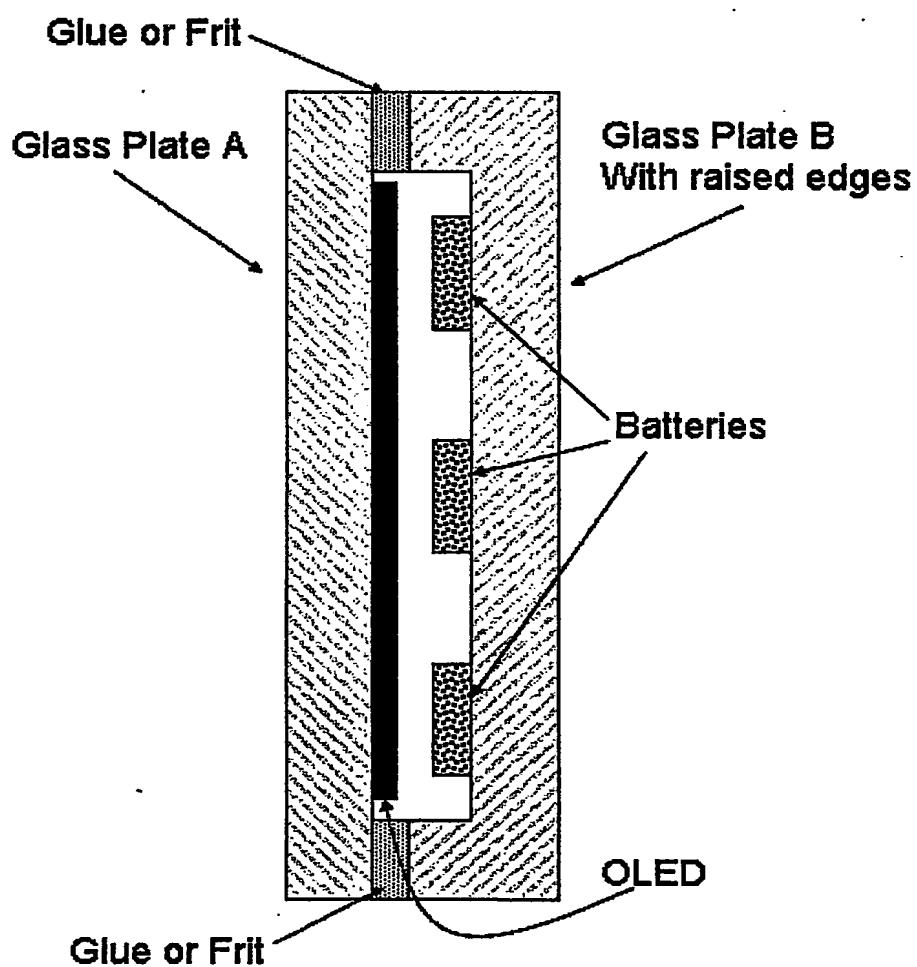
Using patterned OLED devices enclosed in a tile of of this type can be very useful in the creation of illuminated emergency or warning signs, as the signs are well protected, have their own embedded power source and being visible both in daylight and dark conditions.

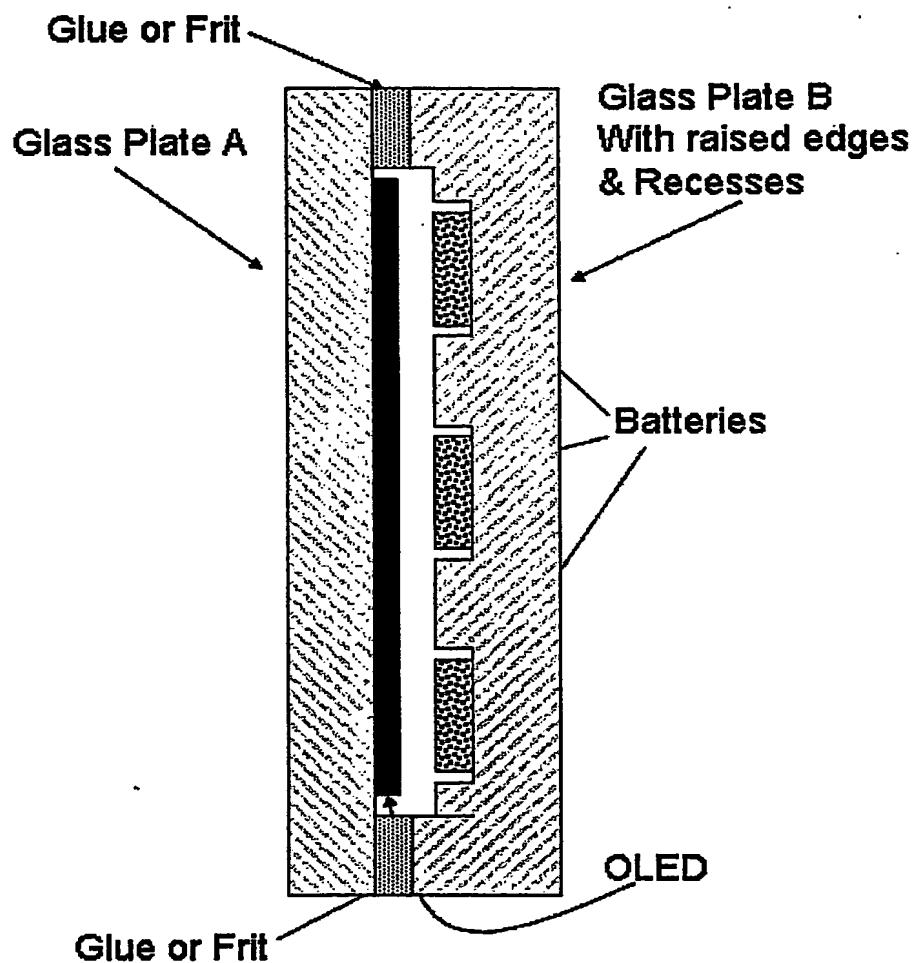
Claim

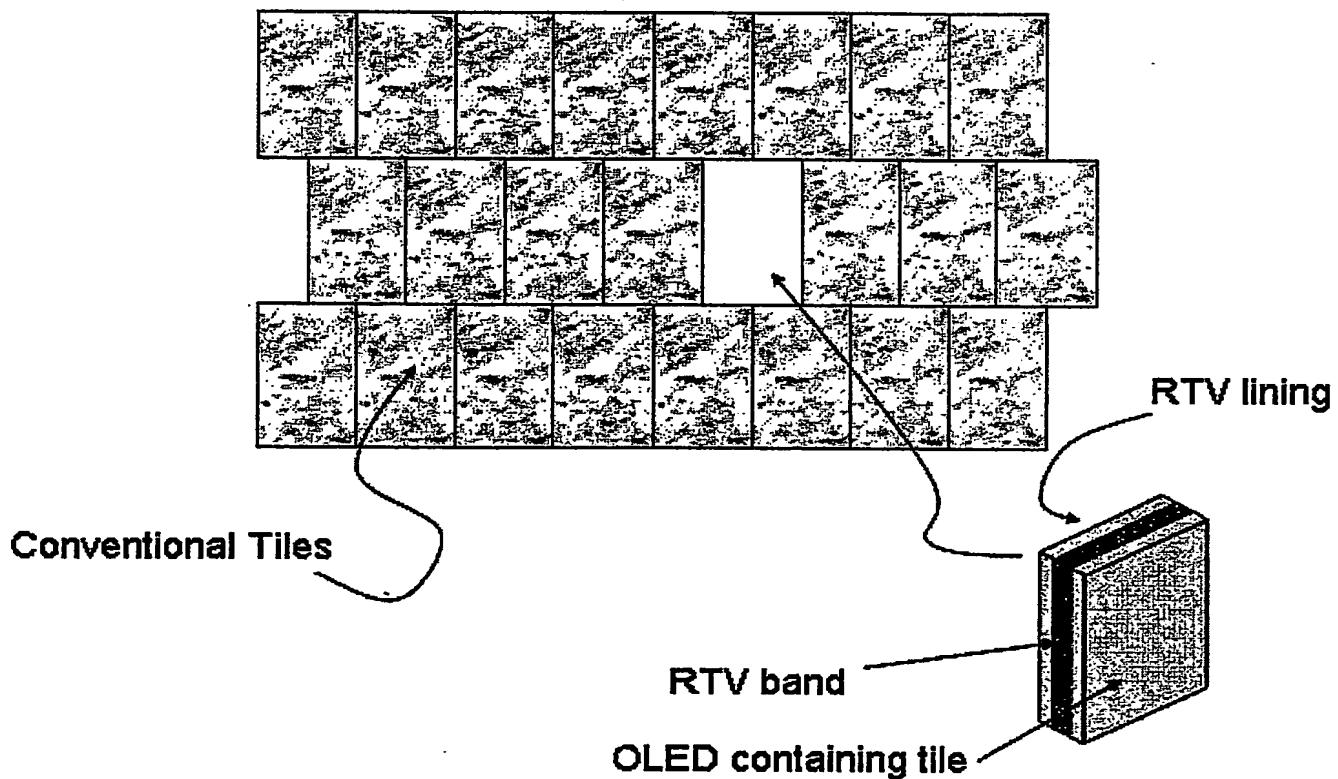
A decorative tiles using organic light emitting diodes substantially as described herein with reference to the drawings.

For the Applicants
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By: 









Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/IL04/001090

International filing date: 28 November 2004 (28.11.2004)

Document type: Certified copy of priority document

Document details: Country/Office: IL
Number: 159774
Filing date: 08 January 2004 (08.01.2004)

Date of receipt at the International Bureau: 20 January 2005 (20.01.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse